

IUTAM Symposium “Critical flow dynamics around moving/deformable structures with design applications”

18-22 June 2018, Hotel-Resort De Sol, Santorini island, Greece

The oral presentations: 15 mn, including questions. The poster presentations: 5 min

Sunday 17 June 2018:

17:00-19:00 *Early registration*

Monday 18 June 2018:

8:30 - 9:30 *Registration and coffee break*

9:30 - 9:45 Welcome address

Session 1 : Flow-Induced Vibrations

9:45 - 10:30 *Emmanuel De Langre*, LadHyX, Ecole Polytechnique, France

Opening Lecture

Does flexibility always reduce fluid-induced stresses in structures?

10:30-11:15: **Chairperson: K. Hourigan**

Flow-Induced Vibration of high-side-ratio rectangular cylinders. J. Zhao, K. Hourigan & M. C. Thompson.

Alteration of the spanwise structure of the turbulent flow past a cylinder subjected to vortex-induced vibrations. S. Gsell, R. Bourguet & M. Braza

Flow-induced vibration of two cylinders in tandem and staggered arrangements. M.D. Griffith, D. Lo Jacono, J. Sheridan & J.S Leontini

12:00 - 12:30:

Vortex induced vibration of symmetric airfoils used in vertical-axis wind turbines. B. Benner, D. Carlson, B. Seyed-Aghazadeh & Y. Modarres Sadeghi

Flow past an oscillating cylinder: effects of oscillation mode on wake structure. S. Peppas, L. Kaiktsis, C. E. Frouzakis & G.S. Triantafyllou

12:30 - 14:00 *Lunch*

Session 2 : **Numerical simulation of oscillating/vibrating flows around bodies**

14:00 - 14:45 **Bernard Geurts**, University of Twente, Netherlands

Keynote Lecture

Reliability of large-eddy simulation in capturing unsteady separation

14:45 -15:15: **Chairperson: M. Braza**

Hydrodynamics of cylinders oscillating with small amplitude in still fluid or free stream. E. Konstantinidis & L. Baranyi

Validation of coupled CFD-CSM methods for vibration phenomena in nuclear reactor cores. A. Papukchiev, P. Pandazis, H. V. Hristov & M. Scheuerer

15:15 - 15:45 *Coffee break*

Session 3.I : **Fluid-Structure Interaction arising in aerodynamics and flow control**

15:45 -16:30 **Patricia Ern**, Institut de Mécanique des Fluides de Toulouse, France

Keynote Lecture

Oscillatory motion and wake of freely falling/rising bodies

16:30 - 17:15: **Chairperson: K. Hourigan**

Vibration mechanisms of two inline cylinders. B. Qin, MD. M. Alam & Y. Zhou

Experimental and numerical investigation of steady fluid forces in axial flow on a cylinder confined in a cylinder array. A. Joly, P. Badel, N. De Buretel De Chasse, O. Cadot, A. Martin, P. Moussou & L. Pastur.

Aerodynamics and flow control of a flapping bristled wing. S. H. Lee, M. Lahooti & D. Kim

17:15 - 17:25 Posters: (5mn for each presentation including questions)

Numerical investigation on the thrust performance of bionic motion wing in schools. Chen Gang, Lv Jinan, Han Jiakun, Zhang Yang & Gong Chunlin

Stress analysis of wind turbine tower flange using fluid-structure interaction method. Myoungwoo Lee, Seok-Gyu Yoon & Youn-Jea Kim

18:00 *Departure to the Volcano, visit and cocktail with finger food in the boat*

Tuesday 19 June 2018:

Session 3.II Fluid-structure interaction arising in aerodynamics and flow control

9:00 - 9:45 Jonathan Morrison, Dept. of aeronautics, Imperial College, London, U.K.

Keynote Lecture

Control of cellular separation using adaptive surface structure

9:45 - 10:30: **Chairperson: P. Ern**

The dynamics of bumblebee wing pitching rotation : measurement and modelling. D. Kolomenskiy, S. Ravi, R. Xu, K. Ueyama, T. Jakobi, T. Engels, T. Nakata, J. Sesterhenn, M. Farge, K. Schneider, R. Onishi & H. Liu

Transitional flow dynamics past a passively flapping airfoil in gusty flow. C. Bose, S. Gupta, S. Sarkar

Collective flapping dynamics of stacked conventional and inverted flags. Hyeonseong Kim & Dagoym Kim

10:30 - 11:00 *Coffee break*

Session 4 Theoretical aspects, simulation and reduced-order modelling of fluid-structure interaction for deformable structures

11:00 - 11:45 Yiannis Ventikos, Mechanical Engineering Dept., University College London, UK

Keynote Lecture

Using multicompartmental poroelasticity to explore brain biomechanics and cerebral diseases

11:45 - 12:15:

Development of a three-dimensional multi-step ice accretion model based on level-set and IBM. A. Al-Kebisi, Y. Hoarau & R. Mose

The shearing mechanism over a deformed surface of breaking waves. S.G Sajjadi & J.C.R. Hunt

12:15 - 13:55 *Lunch*

14:00 - 14:45 Alessandro Bottaro, Scuola Politecnica, University of Genova, Italy

Keynote Lecture

Flow over and around porous, deformable bodies: perspectives from homogenisation theory

14:45 - 15:30: **Chairperson: B. Geurts**

Flutter instability close to a free surface: A local stability analysis. J. Mougel & S. Michelin

FSI simulation using a membrane model: inflation of balloons and flow past sails. A. Mohd Furquan & B. Sanjay Mittal

Numerical simulation on fixed mesh for feedback stabilization of fluid-structure interaction system with a structure given by a finite number of parameters. G. Delay, S. Ervedoza, M. Fournié & G. Haine

15:30 - 16:00 *Coffee break*

16:00 - 16:30 **Erwan Liberge** University of La Rochelle, France

Plenary Lecture

Parametric evolution of reduced order models for fluid-structure interaction

16:30 - 17:30: **Chairperson: Y. Hoarau**

Studying the transition in the flow around a cylinder using a low dimensional Galerkin model and sensitivity analysis. G. Patino, R. Gioria, J.A.P. Aranha & J.R. Meneghini

Reduced Order modelling for plasma aeroelastic control of airfoils in cascade: Dynamic Mode Decomposition. P. Neumann, V. Motta, L. Malzacher, D. Peitsch & G. Quaranta

Dynamic behavior of leading edge vortex and vorticity on suction surface of a heaving elastic airfoil. M. Fuchiwaki

Studying sound production in the hole-tone configuration using compressible and incompressible global stability analyses. R. Longobardi, D. Fabre, P. Bonnefis, V. Citro, F. Giannetti & P. Luchini

17:30 - 17:45 Posters:

Effects of kinematic parameters on bio-inspired flapping wing under the fluid-structure interaction. Han Jiakun, Chen Gang, A.J. Revell.

Topology of 2D boundary layer eruption based on different vortex criteria. A. R. Nielsen, M. Heil, M. Andersen & M. Brons

Diffusive flow characteristics of pollutants in the vicinity of buildings based on wind responses. Seok-Gyu Yoon, Myoungwoo Lee & Youn-Jea Kim

18:30 ~18:45 : *Departure by bus to Nomikos Conference Center - Fira : first gala dinner*

Wednesday 20 June 2018

Session 5 **Rotating effects, fish motion, swimmers, energy harvesting**

8:30 - 9:15 **Eduardo Wesfreid**, ESPCI Ecole Supérieure de Physique et de Chimie Industrielle, France

Keynote Lecture

Experiments on the wake instabilities behind a rotating sphere

9:15-10:15: **Chairperson: J. Morrison**

Smart swimmers. G. Novati, S. Verma & P. Koumoutsakos

Simultaneous energy harvesting using dual piezo-solar devices. M. Nabawy, J. Silva Leon, A. Kennaugh, A. Cioncolini & A.J. Revell

Hydrokinetic energy conversion using a single-cylinder nonlinear oscillator in flow induced vibrations. M. M. Bernitsas & H. Sun

Synergistic flow induced vibration of multiple cylinders in harvesting marine hydrokinetic energy. H. Sun & M. M. Bernitsas

10:15-10:40 *Brief coffee break*

10:40-13:00 *Visit of the archeological site "Acrotiri" by bus transportation*

13:00-14:30 *Lunch*

14:30-15:15 **Yu Zhou**, Harbin Institute of Technology, China

Keynote Lecture

Human versus artificial intelligence in turbulent jet control

15:15 - 15:45: **Chairperson: M. Triantafyllou**

Flapping foil hydrokinetic turbine: from a strongly coupled FSI solver to the experiment in a confined channel. L. Duarte, N. Dellinger, G. Dellinger, A. Ghenaim & A. Terfous

Machine learning of dynamics with applications to flow control and aerodynamic optimization. S.L. Brunton

15:45-16:15 *Coffee break*

Rest of the afternoon free

19:30: *Gala dinner at Monolithos beach*

Thursday 21 June 2018:

Session 6 Compressibility effects in fluid-structure interaction

9:00-9:45 Piotr Doerffer, Institute of Fluid-Flow Machinery, IMP-PAN, Polish Academy of Sciences, Gdansk, Poland

Keynote Lecture

Critical aspects of aerodynamic design involving shock boundary layer interaction in the light of European project TFAST

9:45 - 10:45 **Chairperson: Yu Zhou**

Shock waves asymmetry in a symmetric nozzle. Janusz Telega, Piotr Doerffer, Ryszard Szwaba, Krystyna Namiesnik

Transonic buffet over a supercritical wing by means of Organized Eddy Simulation with stochastic forcing capturing detached flow dynamics. N. Simiriotis, D. Szubet, I. Asproulias, J. Hunt, M. Braza

Numerical simulations for A320 profile in wind tunnel – test section design for the EU H2020 project SMS "Smart Morphing & Sensing for aeronautical configurations. P. Flaszynski, P. Doerffer & R. Szwaba

Effect of frozen turbulence assumption on the local blades vibration on the choke Flutter Instability in transonic UHBR Fan. P. Duquesne, S. Aubert, Q. Rendu & P. Ferrand

10:45 - 11:15 *Coffee break*

11:15-12:00: **Chairperson: P. Flaszynski**

Numerical and experimental investigations of buffet on a diamond airfoil designed for space launcher applications. J. Dumon, Y. Bury, N. Gourdain & L. Michel

Numerical simulation and modelling of a morphing supercritical airfoil in a transonic flow at high Reynolds number. J.-B. Tô, D.M. Zilli, N. Simiriotis, A. Marouf, Y. Hoarau & M. Braza,

Fluid-structure simulation of a piston shock-tube using an adaptive ALE scheme in the non-ideal compressible-fluid regime. B. Re & A. Guardone

12:00 - 14:00: *Lunch*

Session 7.I Fluid-structure interaction, Morphing and Control

14:00-14:45 Jean-François Rouchon, Laboratoire de Plasma et Conversion d'Énergie, Toulouse, France

Keynote Lecture

Electroactive morphing for the design of smart aero-structures involving innovative actuators

14:45 - 16:00: **Chairperson: F. Auteri**

Fabrication and characterization of folded foils supporting streamwise traveling waves. S. Calisch, N. Gershenfeld, D. Fan, G. Jodin & M. Triantafyllou

The Aerodynamic and aeroacoustic effect of passive high frequency oscillating trailing edge flaplets. E. Talboys, T. Geyer & C. H. Bruecker

Electroactive morphing vibrating trailing edge of a cambered wing: PIV, turbulence manipulation and velocity effects. G. Jodin, J.F. Rouchon, M. Triantafyllou, S. Cazin, P. Elyakime, M. Marchal, M. Braza

Experimental and numerical investigation of electro-active morphing on a supercritical wing in high Reynolds numbers. N. Simiriotis, G. Jodin, A. Marouf, Y. Hoarau, J.F. Rouchon & M. Braza

Camber actuation of an articulated wing with electromechanical actuators. A. Giraud, M. Cronel, I. Ramos & B. Nogarede

16:00 - 16:05 Posters

Wind tunnel experimental design of an electroactive morphing high-lift flap on a two-element wing in subsonic speeds. Y. Bmegaptche, G. Jodin, A. Marouf, J.B. Tô, G. Harran, J.F. Rouchon & M. Braza

16:05 - 16:30 *Coffee break*

16:30-17:15 **Haecheon Choi**, Seoul National University, South Korea

Keynote Lecture

Bio-mimetic flow control for enhancing the aerodynamic efficiency

17:15 - 18:30: **Chairperson: Y. Ventikos**

Numerical study of trailing-edge dynamics of a two element airfoil-flap with Morphing flap at high Reynolds number. A. Marouf, N. Simiriotis, J.B. Tô, Y. Bmegaptche, Y. Hoarau, J.F. Rouchon & M. Braza

The passive separation control of an airfoil using self-adaptive hairy flaps. Chunlin Gong, Zhe Fang, Gang Chen & A.J. Revell.

Dynamic response of wall-mounted flaps in a crossflow. J. O'Connor & A.J. Revell

Comparison of low, medium and high fidelity numerical methods for unsteady aerodynamics and nonlinear aeroelasticity. C. Fernandez-Escudero, M. Gagnon, E. Laurendeau, S. Prothin, G. Michon & A. Ross

Effects of an oscillating flap on the main airfoil unsteady lift in grid turbulence. H. Stapountzis, A. Barlas, G. Papageorgiou, A. Patsiouras.

Friday 22 June 2018:

Session 7.II Fluid-structure interaction, Morphing and Control

8:30 - 9:15 *Julian Hunt*, University College London, UCL, UK and IMFT, France

Keynote Lecture

Fundamentals and applications of critical fluid-fluid turbulent interfaces interacting with singularities of thin deformable solid structures

9:15 - 9:45 **Chairperson: *H. Choi***

Fast sensitivity analysis for the design of morphing airfoils at different frequency regimes
F. Kramer, M. Fuchs, T. Knacke, C. Mockett, E. Özkaya, N. Gauger & F. Thiele

Thin shear layers in high resolution Direct Numerical Simulations of turbulence. T. Ishihara, K. Morishita & J.C.R. Hunt

9:45 - 9:55 Posters:

Modeling of magnetic shape memory alloys dedicated to a high frequency vibrating trailing edge morphing wing. M. Carvalho, G. Jodin, C. Nadal, J.F. Rouchon & M. Braza

An explanatory theory for unsteadiness of aerodynamic characteristics of variable sweep morphing aircraft. P. Bai, Q. Chen, F. Li

9:55 - 10:30 *Coffee break*

10:30 - 11:00 *Alain Fontaine*, Airbus and Pégase Co.

Keynote Lecture

Challenges of aeronautic industry

11:00 - 11:45 : **Chairperson: *J.F. Rouchon***

Scaling laws for an airfoil with MFC-actuated trailing edge plate. F. Auteri, P. Bettini & N. Bonfanti

CFD simulations with dynamic morphing on the Airbus A320 airfoil. K. Diakakis & G. Tzabiras

URANS flow calculations around a morphing and heaving airfoil. S. Polyzos & G. Tzabiras

Session 8 Bifurcations and analytic modelling in FSI

11:45 - 12:30 *Horia Hangan*, Wind Engineering, Energy and Environment (WindEEE)
Research Institute - Canada

